

Developing an Open Source Option for NASA Software

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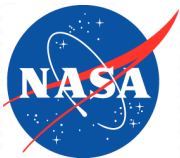
October 2004





Overview

- What is Open Source software?
- Ames Open Source working group
- “Developing an Open Source Option ... ”
- NASA Open Source Agreement (NOSA)
- NASA OS on the web
- Example: WorldWind



> What is Open Source Software?

- Software that includes source code
- OS agreements grant certain rights:
 - use (execute) the code
 - modify
 - redistribute
- Agreements tend to vary a bit with respect to terms of redistribution
- Open Source Initiative (OSI) acts as arbiter of definitions, usage agreements



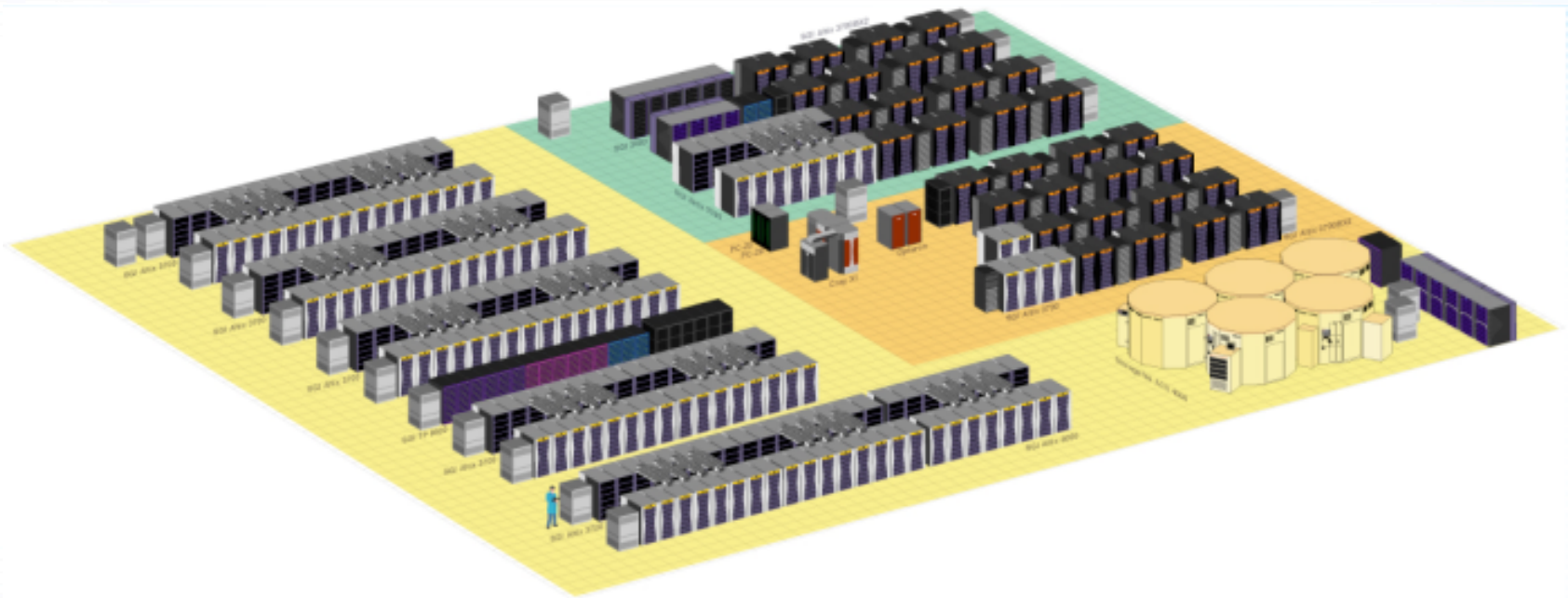
Where is OS Software?

- Industry, government, academia
- most Internet infrastructure
- much of high-end computing software
- over 77K projects at one leading site alone (SourceForge)
- Mac OS X (Open BSD)



Project Columbia

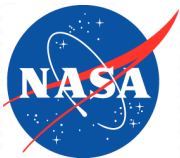
- SGI Altix system at Ames: Linux
- 20 512-Itanium boxes: 10240 processors





Use vs. Release

- We are interested in Open Source *release* of NASA-authored software
- For some government agencies, the debate is over the *use* of OS software
- For us (Information Technology Directorate), *use* of OS software a given
 - long tradition of Unix systems
 - most of Unix community has moved to Linux



> Report on DoD Use of “FOSS”

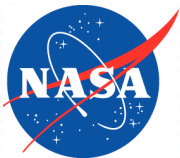
- “Use of Free and Open-Source Software (FOSS) in the U.S. Department of Defense” by Terry Bollinger of Mitre, 1/03
- “FOSS plays a more critical role in the DoD than has generally been recognized”
 - Found use of 115 FOSS applications in DoD, 251 examples of their use
- Advocates use FOSS to promote diversity
- See also: egovos.org





Ames OS Working Group

- Ames convenes a working group to develop an OS release process, 5/02:
 - Information Technology directorate chief, deputy directorate chief
 - Ames Chief Patent Counsel
 - Ames Software Release Authority
 - IT directorate technical staff members



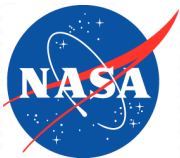
“Developing an Open Source Option for NASA Software”

- Presented before working group: 2/03
- Published as a NAS technical report: 4/03
 - NAS-03-009, available on the web
- Noted by Slashdot: 5/03
- Noted other NASA centers & HQ: 6/03
- ...



“Developing an OS Option ...”

- Marshaled arguments in favor of an OS option, from a variety of perspectives
- Provided a comparison of some of the leading usage agreements
- Discussed NPG 2210.1 (External Release of NASA Software) issues w.r.t. OS
- Proposed Mozilla license as a model
- Nine appendices -- 52 pages total

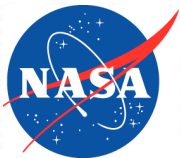




“Developing an OS *Option* ...”

- page 3:

We say *option* because we are not proposing that *all* NASA software be released Open Source. We recognize that some software, because of export control, ownership or commercialization concerns, may not be suitable for Open Source.



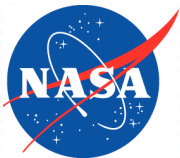
NASA Perspective

- The “National Aeronautics and Space Act of 1958” (NASA charter) directs NASA to:
 - plan, direct, and conduct aeronautical and space activities;
 - ...
 - *provide for the widest practicable and appropriate dissemination of information concerning [NASA’s] activities and the results thereof;*



NASA Perspective (2)

- The NASA mission:
 - To understand and protect our home planet,
 - To explore the universe and search for life,
 - To inspire the next generation of explorers ... as only NASA can.
- To accomplish the first two items, NASA will need to work with other entities
- For the third, need effective dissemination



NASA Perspective (3)

- Intellectual Property (IP) rights and ownership issues can be a significant stumbling block:
 - mix of civil servant and contractor authors
 - software projects with multiple contractors
 - projects that outlast contractor tenure
 - external collaborations difficult
- These issues will continue to arise
 - e.g., with respect to the Ames UARC



Software Users' Perspective

- Decision to use a software package based on many factors:
 - fitness for a particular use
 - cost
 - expectations w.r.t. provider longevity
- The longevity issue tends to come up more often in research environments
 - more use of software from small entities
 - do not want to be left with no recourse



Developers' Perspective

- Software developers are necessarily software users
- Developers' motivations much the same as for traditional publishing:
 - peer review, feedback
 - community recognition
 - foster collaborations
- *Software release is essentially a type of publishing in IT research*





PITAC Perspective

- President's Information Technology Advisory Committee (2000)
- Participants from industry, gov't, academia
 - including NASA (NAS division chief)
- Three recommendations:
 - encourage OS software development
 - establish “level playing field” for procurement
 - do an analysis of OS agreements



Larry Smarr Perspective

- Founder of the National Center for Supercomputing Applications (NCSA)
 - birthplace of HDF, Mosaic, among other things
- In Salon.com (1/02):

Some universities are dead set against giving [software code] away. But I don't think universities should be in the moneymaking business. They ought to be in the changing-the-world business, and Open Source is a great vehicle for changing the world.



Computing Research Association Perspective

- “IT IP generated by universities is overvalued by commercialization and licensing officials; it is fundamentally different from pharmaceutical and agricultural IP, which have been a significant source of income.”
- IT researchers have more to lose than to gain by the establishment of high barriers to industry access to IT IP.



Dep't of Energy Perspective

- ASCI / ASCR programs:
 - software produced in work funded by these programs: OS by default
- Note that these programs support weapons work
- DOE has also released some codes under the LGPL



Impact of “Developing ...”

- Similar to the types of impact we hope to achieve publishing research articles:
 - peer review
 - community recognition and excitement
 - fostering collaborations
- Provided some catalyst for legal team to move forward on NASA OS agreement
- Visibility in NASA outside of Ames



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Your Rights Online: Google Desktop Search Functions As Spyware

Posted by [michael](#) on Friday October 15, @06:00PM

from the multi-talented dept.
dioscaido writes "Users of the *Google Desktop Search* software beware -- it *indexes your files across all users on your PC*, bypassing user protections. The Google cache feature allows all users to browse the contents of messages and files it has indexed, irrespective of who is logged in. 'This is not a bug, rather a feature,' says Marissa Mayer, Google's director of consumer Web products. 'Google Desktop Search is not intended to be used on computers that are shared with more than one person.'" Reminds me of a [Neal Stephenson essay](#): "The Hole Hawg is dangerous because it does exactly what you tell it to. It is not bound by the physical limitations that are inherent in a cheap drill, and neither is it limited by safety interlocks that might be built into a homeowner's product by a liability-conscious manufacturer. The danger lies not in the machine itself but in the user's failure to envision the full consequences of the instructions he gives to it."

([Read More...](#) | 2 comments | [yro.slashdot.org](#))

Games: Bungie Speaks On Halo 2 Leak

Posted by [Zonk](#) on Friday October 15, @05:10PM

from the coming-down-hard-on-punks dept.
BlueMoon writes "A moderator on the official Halo 2 forums posted some speculations and warnings about the Halo 2 leak. To the question where the leak originated he answered "is almost positively the work of some jerk in the manufacturing plant who pocketed the game". They also send out a warning that posting any kind of information about leak will result in "having your Xbox Live account's ability to play Halo 2 crippled as we can and we will ban your gamertags from access to vital parts of Halo 2's online experience".' TalkXbox has a repost of an official statement asking community members to [assist in the capture](#) of the folks who leaked the game.

([Read More...](#) | 102 of 143 comments | [games.slashdot.org](#))

Science: Probe Crash Due to Misdigned Deceleration Sensor

Posted by [michael](#) on Friday October 15, @04:20PM

from the for-want-of-a-nail dept.
squirrelhack writes "Seems as though the *Genesis*

Google

[Science](#)
• [Probe Crash Due to Misdigned Deceleration Sensor](#)
• [Male Bass in Potomac Producing Eggs](#)
• [To Mars and Back in Ninety Days](#)
• [A Killer App For Seaway](#)
• [Maybe It Wasn't The Meteor. After All](#)
• [Next Mars Mission Will Look for Landing Sites](#)
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☐ Isaac
☐ Wayne
☐ (kg * m) / (s * s)
☐ Massachusetts
☐ Cowboy Newton

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Comments:531 | Votes:36561

Book Reviews

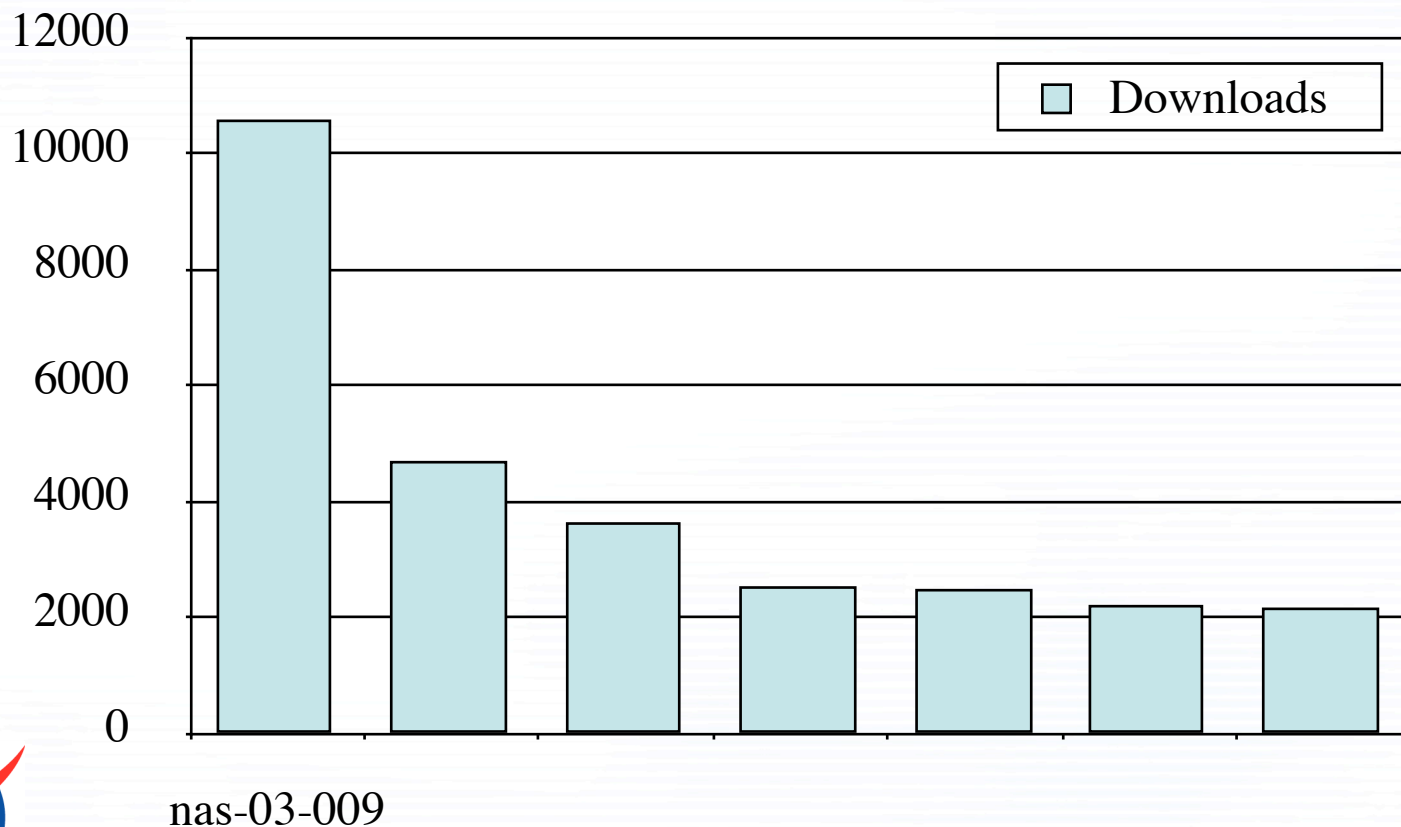
Don't choose your books in a mental vacuum -- take advantage of reader-submitted book reviews (and linked discussions) of science fiction, science, programming and other books. For instance:

- [Blaine Hilton's review of](#)




Impact of slashdot

- Downloads of nas-03-009 over twice that of any other document on our server



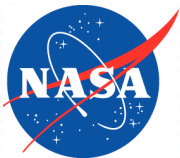
NASA Open Source Agreement

- NASA Open Source legal team:
 - ARC: R. Padilla
 - GSFC: B. Geurts, D. Cox (now at ARC)
 - other NASA centers ...
- Open Source Initiative certified 
- OSI asked that NOSA be generalized so that it may work for other gov't agencies
- NASA prefers “agreement” to “license”



NASA OS on the Web

- Web site provides “one stop shopping”
- We considered `opensource.nasa.gov`
 - easier to get `opensource.*.nasa.gov`
 - deferred on agency-wide URL for the moment
- Downloader registration:
 - registration is optional, cannot be mandatory, per OSI OS definition
- JPL: OS, but not via an `opensource.*` site



opensource.arc.nasa.gov

NASA Ames Research Center OpenSource

http://opensource.arc.nasa.gov/

NASA NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

AMES RESEARCH CENTER

Ames Home > Open Source Software

NOSA Software Agreement
Other NASA Software

NASA OPEN SOURCE SOFTWARE

NASA conducts research and development in software and software technology as an essential response to the needs of NASA missions. Under the NASA Software Release policy, NASA has several options for the release of NASA developed software technologies. These options now include Open Source software release. This option is under the NASA Open Source Agreement "NOSA".

The motivations for NASA to distribute software codes Open Source are:

- to increase NASA software quality via community peer review
- to accelerate software development via community contributions
- to maximize the awareness and impact of NASA research
- to increase dissemination of NASA software in support of NASA's education mission

PROJECTS

[Livingstone2/Skunkworks](#)

Livingstone2 is a reusable artificial intelligence (AI) software system designed to assist spacecraft, life support systems, chemical plants or other complex systems in operating robustly with minimal human supervision, even in the face of hardware failures or unexpected events.

[IND: Creation and Manipulation of Decision Trees from Data](#)

A common approach to supervised classification and prediction in artificial intelligence and statistical pattern recognition is the use of decision trees. A tree is "grown" from data using a recursive partitioning algorithm to create a tree which (hopefully) has good prediction of classes on new data. Standard algorithms are 1) that of Breiman, Friedman, Olshen, and Stone; and 2) Id3 and its successor C4 (by Quinlan). As well as reimplementing parts of these algorithms and offering experimental control suites, IND also introduces Bayesian and MML methods and more sophisticated search in growing trees. These produce more accurate class probability estimates that are important in applications like diagnosis.

[CODE](#)

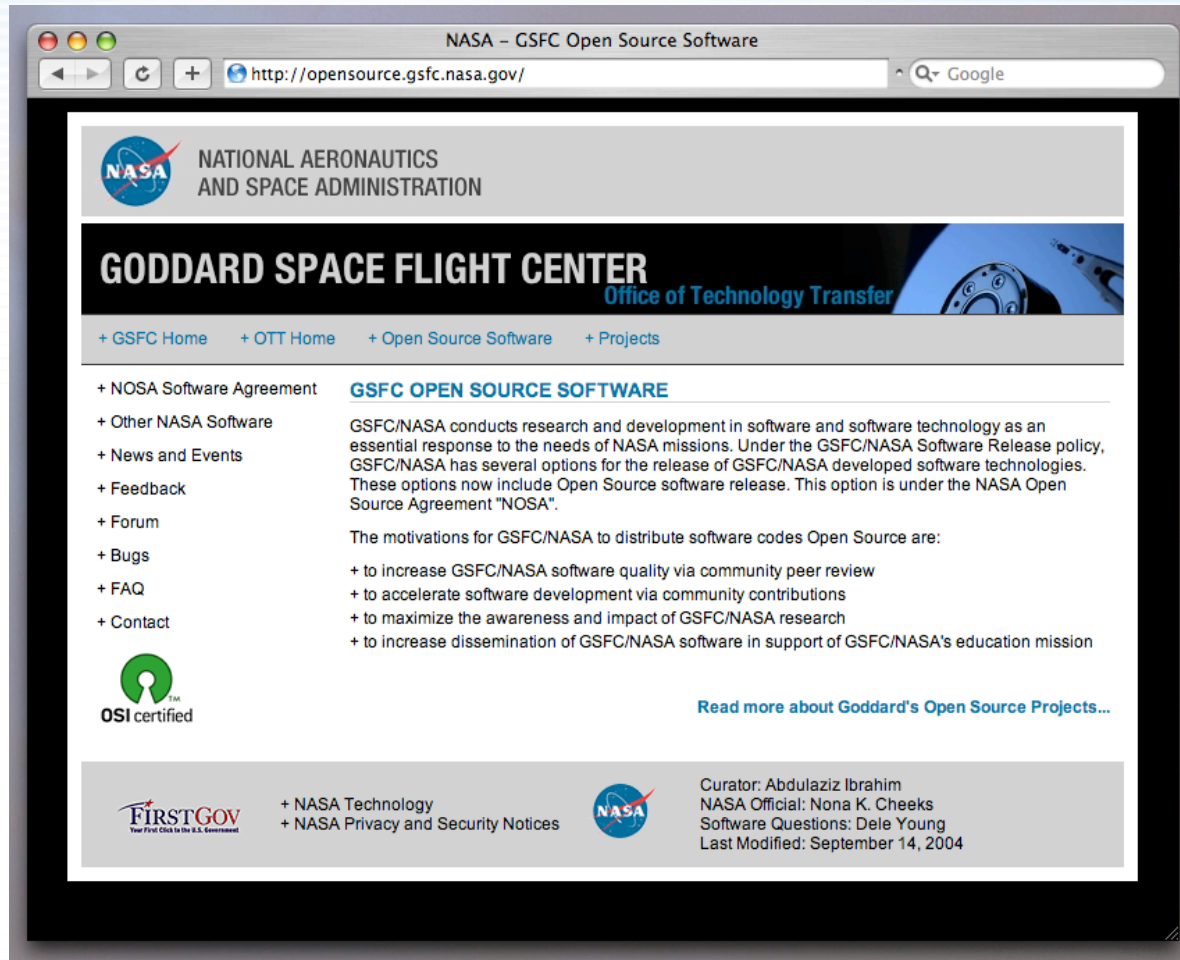
CODE is a software framework for control and observation in distributed environments. This framework enables the observation of distributed resources, services, and applications. Observations are made by modular components called sensors, the information observed is encapsulated as events, and these events are transmitted from where they are produced to whoever wants to consume them using an event management framework. Further, the CODE framework allows people or agents to control a distributed system by allowing them to take actions on remote systems using modular components called actors.

[World Wind](#)

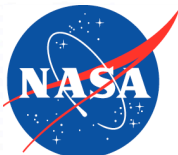
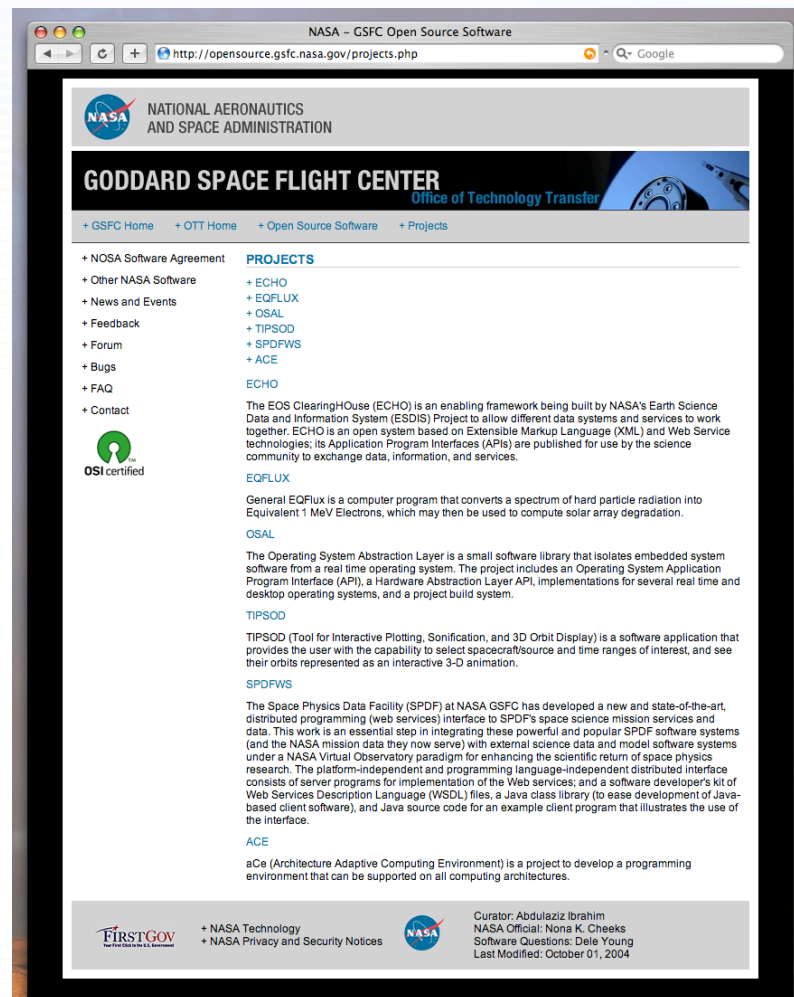
NASA World Wind is a graphically rich 3D virtual globe for use on desktop computers running Windows 2K or XP. It combines NASA imagery generated from satellites that have produced the Blue Marble, LandSat 7, SRTM, MODIS and more.



opensource.gsfc.nasa.gov

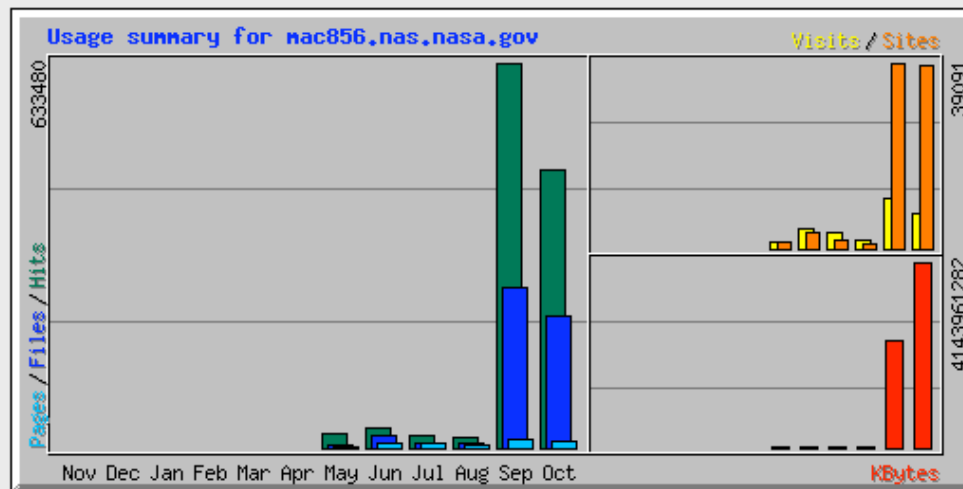


opensource.gsfc projects



Experiences so Far

- Initial four pilot projects released: 1/04



Summary by Month										
Month	Daily Avg				Monthly Totals					
	Hits	Files	Pages	Visits	Sites	KBytes	Visits	Pages	Files	Hits
Oct 2004	30379	14552	676	481	38359	4143961282	7224	10145	218280	455696
Sep 2004	21116	8831	498	352	39091	2376169822	10578	14967	264942	633480
Aug 2004	574	256	187	55	1194	26423987	1720	5799	7952	17823
Jul 2004	654	294	245	106	1911	8928120	3302	7618	9137	20281
Jun 2004	1124	628	242	138	3476	23108995	4169	7270	18861	33740
May 2004	993	204	129	72	1448	7121060	1594	2844	4503	21858
Totals						6585713266	28587	48643	523675	1182878



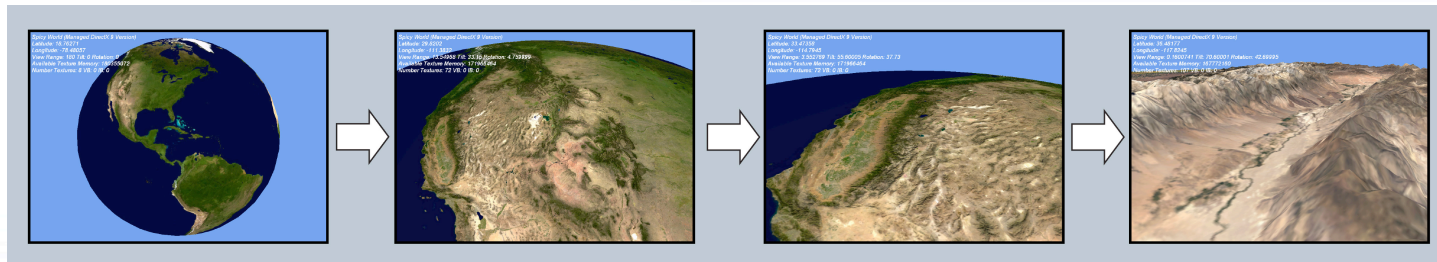
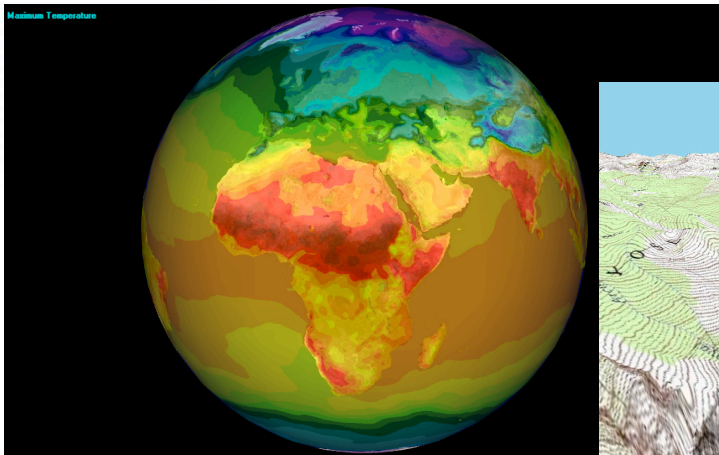
The Big Hit So Far: WorldWind

- Ames Learning Technologies
 - NASA education mission
- WorldWind written with MS .net -- runs on MS Windows platforms
- Does interactive 3-D graphics: displays the globe with earth science data
- Communicates with data servers via the WMS protocol



WorldWind

- Over 100K downloads!





Challenges

- How do we quantify impact?
 - old software release options required user registration -- count registrants
 - OS requests registration, but not required
- Handling cases where software package includes software distributed under GPL
 - GPL trumps other OS licenses (e.g., NOSA)





Conclusion

- NASA now has an Open Source option for software release
- NASA legal has stepped up to develop a usage agreement that we can use for OS releases -- the NOSA
- ARC and GSFC now have sites dedicated to OS releases
- Pace of OS releases beginning to pick up

